

NEWCASTLE RESERVOIR



Introduction

Newcastle Reservoir is located in the northern foothills of the Pine Valley Mountains in southwestern Utah. It is a moderate size impoundment of a wide stream valley. This reservoir should not be confused with Grass Valley Reservoir, a small reservoir high in the Pine Valley Mountains, listed on some maps as New Castle Reservoir.

The reservoir shoreline is privately owned by the

Newcastle Irrigation Company with unrestricted public access. Land outside the immediate reservoir area is owned by the BLM. The dam, an earth-fill, was built in 1956. Water is used primarily for irrigation and recreation. Defined beneficial uses include: water recreation excluding swimming; propagation of cold water species of game fish and aquatic life; and agricultural needs.

Characteristics and Morphometry

Lake elevation (meters / feet)	1,659 / 5,443
Surface area (hectares / acres)	66 / 163
Watershed area (hectares / acres)	32,113 / 73,319
Volume (m ³ / acre-feet)	
capacity	4,735,414 / 3,839
conservation pool	616,750 / 500
Annual inflow (m ³ / acre-feet)	
Retention time (years)	
Drawdown (m ³ / acre-feet)	
Depth (meters / feet)	
maximum	23.5 / 77.5
mean	7.2 / 23.6
Length (meters / feet)	2,010 / 6,595
Width (meters / feet)	450 / 1,476
Shoreline (km / miles)	4.8 / 3

Location

County	Washington
Longitude / Latitude	113 31 15 / 37 38 58
USGS Map	Newcastle, Utah 1972
Cataloging Unit	Southern Escalante Desert (16030006)

Recreation

Newcastle Reservoir is on an improved secondary road between the communities of Newcastle and Pinto. Access is easiest from Newcastle. From U-56, travel 5 blocks south in Newcastle and turn east (left). The road winds up a wide canyon for about 1.5 miles, then climbs the canyon wall at the dam. Access to the reservoir is possible on primitive

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roads past the dam on the left.

Fishing, is the primary recreational activity on the lake. Boating, picnicking, and primitive camping, are also possible. The reservoir is accessible year round. On a per acre basis usage of the reservoir is high, comparable to Otter Creek or Minersville reservoirs.

Recreational facilities are primitive, although it is possible to launch a boat in the reservoir. There are no public or private campgrounds in the area. Cedar City is 30 miles east and has all services.

Watershed Description

Newcastle Reservoir in the lower slopes of the Pine Valley Mountains, where Pinto Creek emerges from the mountains into the Escalante Desert through an unusual short, deep, U-shaped stream valley. It has a large natural drainage basin that has been enlarged by a tunnel through the ridge at the headwaters of South Fork Pinto Creek to divert water from the upper Santa Clara River drainage. This area is a substantial part of the highest portion of the Pine Valley Mountains, and greatly increases the water entering Newcastle Reservoir.

The watershed high point (in the upper Santa Clara drainage) the west shoulder of Big Point, is 3,018 (9,900 ft) above sea level, thereby developing a complex slope of 4.8% to the reservoir. The inflows are Pinto Creek and Little Pinto Creek. The outflow is Pinto Creek, but water is primarily diverted into a pipeline for sprinkler irrigation.

The vegetation communities are comprised of pinyon-juniper, sage-grass, shadscale, bitterroot-mahogany, spruce-fir, pine, aspen and associated grasses and forbes. The immediate watershed receives 30 - 41 cm (12 - 16 inches) of precipitation annually with a frost-free season of 120 - 140 days at the reservoir.

The soil is of limestone origin with rapid permeability and erosion. The soil associations that compose the watershed are listed in Appendix III.

Land use is multiple use and recreation, the major use being livestock grazing. Much of the watershed has received heavy historical grazing which may be contributing to runoff and soil erosion. The strip mine at Iron Mountain composes 2% of the watershed, and 1% each is used for cropland and pasture.

Limnological Assessment

The water quality of Newcastle Reservoir is good. It is considered to be hard with a hardness concentration value of approximately 190 mg/L (CaCO₃). Those parameters that has exceeded State water quality standards for defined beneficial uses are total phosphorus, dissolved oxygen and temperature. The average concentration of total phosphorus in the water column during the three periods of study were 70, 37 and 96 ug/L which all exceed the recommended pollution indicator for

phosphorus of 25 ug/L. The maximum temperature standard for a cold water fishery is 20°C. Temperature exceedences occur primarily later in the summer when the reservoir when the reservoir is drawn down due to meet irrigation needs downstream. As was the case on August 2, 1990 temperatures in the reservoir ranged from 24.1°C at the surface to 21.7°C at the bottom. In addition as is evident from the 9/9/92 profile dissolved oxygen concentrations do decline in the hypolimnion. This suggest that there is a large demand for dissolved oxygen at the sediment-water interface. Although anoxic conditions are not present during late summer if extended ice conditions exist during the winter anoxic conditions may develop. A profile taken during May, 1992 had levels as low as 1.6 mg/L dissolved oxygen near the bottom with a substantial amount of the water column below the standard of 6.5 for a cold water fishery. This data substantiate the fact that water quality impairments do occur in the reservoir and that some winter time monitoring should be conducted to assess the extent of oxygen depletion in the water column.

Current data suggest that the reservoir is currently a nitrogen limited system. TSI values indicate the reservoir

Limnological Data			
Data averaged from STORET sites: 494061, 494062			
Surface Data	1979	1990	1992
Trophic Status	E	M	E
Chlorophyll TSI	-	47.36	46.57
Secchi Depth TSI	50.01	46.09	46.94
Phosphorous TSI	63.19	50.90	68.25
Average TSI	56.6	48.12	53.92
Chlorophyll <i>a</i> (ug/L)	-	4.8	5.2
Transparency (m)	2	2.6	2.5
Total Phosphorous (ug/L)	60	26	85
pH	8.5	8.5	8.3
Total Susp. Solids (mg/L)	-	2.8	<3
Total Volatile Solids (mg/L)	-	0	1
Total Residual Solids (mg/L)	-	-	2
Temperature (°C / °f)	20/68	20/69	19/66
Conductivity (umhos.cm)	399	809	382
Water Column Data			
Ammonia (mg/L)	0.15	0.03	0.03
Nitrate/Nitrite (mg/L)			
Hardness (mg/L)			
Alkalinity (mg/L)			
Silica (mg/L)			
Total Phospho			
Miscellaneous			
Limiting Nutrient			
DO (Mg/l) at 75% depth	6.2	6.9	6.2
Stratification (m)	1-2	NO	NO
Depth at Deepest Site (m)	16	4.6	9.0

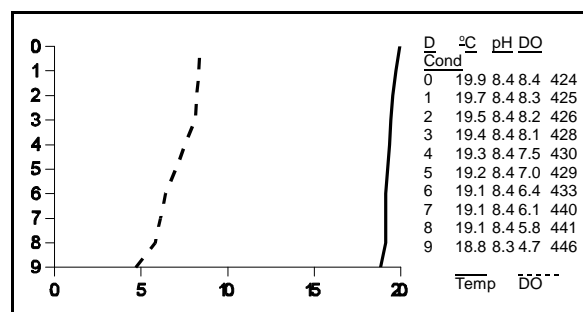
Information	
Newcastle Reservoir Company	439-5300
Five County Association of Governments	
Division of Wildlife Resources	538-4700
Division of Water Quality	538-6146

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is upper mesotrophic to eutrophic. The reservoir does not typically stratify due to rapid drawdown, and mixing associated with the shallow nature of the reservoir later in the summer.

According to DWR no fish kills have been reported in recent years. The reservoir supports a population of smallmouth bass (*Micropterus dolomieu*) and rainbow trout (*Oncorhynchus mykiss*). Recent stocking reports indicate that DWR stocked Newcastle Reservoir with 25,000 advanced fingerling (6") and 6,500 catchable rainbow trout in 1991. DWR currently owns a 500 acre-foot conservation pool.

It was reported by the DWR that the bottom fauna observed in the reservoir were chironomids of which were sparse. Crayfish are reported to be abundant in the reservoir and smallmouth bass have also been introduced. In 1979 limited macrophytes and algal blooms were observed by DWQ staff. The NES reported the following dominant plankton present in 1975: *Stephanodiscus* sp., *Nitzschia* sp., *Elakatothrix* sp., *Asterionella* sp., and *Oocystis* sp.



Phytoplankton in the euphotic zone include the following taxa (in order of dominance)

Species	Cell Volume (mm ³ /liter)	% Density By Volume
<i>Coelosphaerium</i> sp.	0.250	47.19
<i>Ankyra judayi</i>	0.122	23.05
<i>Euglena</i> sp.	0.075	14.16
<i>Ankistrodesmus falcatus</i>	0.035	6.59
Pennate diatoms	0.022	4.19
Unknown spherical green alga	0.017	3.15
Total	0.519	
Shannon-Weaver [H']	1.46	
Species Evenness	0.75	
Species Richness	0.30	

The phytoplankton community is dominated by blue-green algae and flagellates indicative of more productive waters with limited water quality.

Pollution Assessment

Nonpoint pollution sources include: sedimentation and nutrient loading from grazing; sedimentation and heavy metal loading from mining; and wastes or litter from recreation. Cattle graze in the watershed and around the reservoir.

There are no point pollution sources in the watershed.

Beneficial Use Classification

The state beneficial use classifications include: boating and similar recreation (excluding swimming) (2B), cold water game fish and organisms in their food chain (3A) and agricultural uses (4).

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